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proterandrous plants results in increasing the percentage of self-pollinated plants, and is a practice of doubtful value."

SMITH¹¹ has issued a bulletin dealing primarily with the results of selection of ears which are placed high on the stalks and those which are placed low on the stalks, and showing that very material difference may be secured by five years' selection. A comparison is then made between the two strains so produced in regard to qualities such as time of maturity, yield, etc. The results accord very well with the notion that ordinary varieties of corn are much hybridized, and that the selection results in a partial separation of the biotypes involved.—GEO. H. SHULL.

Morphology and sexuality of *Aspergillus* and *Ascophanus*.—In *Aspergillus repens*, a form differing slightly in structure from *Aspergillus herbariorum* as described by Miss FRASER and Miss CHAMBERS,¹² Miss DALE¹³ describes another case of so-called reduced fertilization among the Ascomycetes. After a brief historical and systematic consideration of the species, she describes the multinucleate hyphae of the mycelium, from which arise the multinucleate conidia as apical swellings. The archicarp is initiated as a slender branch, which usually soon becomes regularly and closely coiled into a spiral. The regular occurrence of definite ascogonia and antheridia as figured by DEBARY was rarely found, the antheridium often being absent. No convincing proof of a fusion of sexual organs, even when both were present, was discovered. Transverse walls, whose position and number vary considerably, appear in the archicarp either very early or at a much later stage. Ascogenous hyphae develop in some cases from all of the cells of the ascogonium. The investing hyphae show great variations in the time at which they arise, as well-developed ascogonia with ascogenous hyphae quite uninvested are often found. The young archicarp, which arises as a multinucleate branch, possesses nuclei of about uniform size. Later variations in size of the nuclei appear, which Miss DALE accounts for chiefly by a fusion in pairs, although nuclei may perhaps grow. Such nuclear fusions are figured in all cells of the ascogonium. Since no antheridium is believed to fuse with the oogonium, these nuclear fusions are held to be reduced sexual ones. These fusion nuclei pass into the ascogenous hyphae. In the development of the ascus, which arises from the penultimate cell of a hypha, the usual nuclear fusions and subsequent triple divisions occur. Karyokinesis was not observed.

CUTTING¹⁴ finds in *Ascophanus carneus* still another case of reduced fertiliza-

¹¹ SMITH, L. H., The effect of selection upon certain physical characters in the corn plant. Ill. Agric. Exper. Sta. Bull. 132:50-60. 1909.

¹² FRASER, MISS H. C. I., AND CHAMBERS, MISS H. S., The morphology of *Aspergillus herbariorum*. Ann. Mycol. 5:419-431. 1907.

¹³ DALE, MISS E., On the morphology and cytology of *Aspergillus repens* DeBary. Ann. Mycol. 7:215-225. 1909.

¹⁴ CUTTING, E. M., On the sexuality and development of the ascocarp of *Ascophanus carneus* Pers. Annals of Botany 23:399-417. 1909.

tion. The fungus, whose spores start to germinate in alkaline media, was not successfully cultivated in the laboratory. The cross-walls of the multinucleate cells of the vegetative hyphae have a pore, on each side of which are a number of deeply staining granules, whose function was not determined. The archicarp, a scolecite arising as a branch from a vegetative hypha, consists of a basal vegetative portion, a central ascogonial part, and a terminal vegetative region, which is regarded as a functionless trichogyne. The number of cells in each of these regions varies greatly. From the basal region numerous investing hyphae arise. Although the ascogonia grow crowded together, each fruit arises from a separate ascogonium. The cells of the ascogonial portion have each a pore in their transverse walls, which is guarded by small granules early fusing together to form a pad closing the pore. This pad eventually disappears, leaving the multinucleate ascogonial cells in communication. Nuclear fusions are believed to occur in all of the cells of the ascogonial portion. No nuclear migrations were observed, fusions occurring even before the pads disappear. Ascogenous hyphae arise from any or all of the ascogonial cells. Each ascogonial cell is regarded as female, and in the absence of an antheridium the nuclear fusions are held to represent a type of reduced fertilization. The asci develop from the penultimate cells of the recurved tips of the ascogenous hyphae in the usual way. The usual nuclear fusions and divisions occur in the development of the ascus. No karyokinetic figures were observed, and the method of spore-formation is not described.—J. B. OVERTON.

Respiration and fermentation.—KOSTYTSCHEW, in a preliminary paper,¹⁵ points out that "the metabolism of the complex processes of vital oxidation remain yet quite unexplained, chiefly because the oxidases, according to the latest researches, are unable to produce a direct combustion of the carbohydrates." Conceding that anaerobic respiration is identical with alcoholic fermentation, he enumerates the possibilities as to the rôle of zymase in respiration: (1) the zymase of seed plants is not identical with that of yeast; (2) alcoholic fermentation in seed plants occurs in the presence of O_2 , but has nothing to do with aerobic respiration; (3) alcoholic fermentation is the first stage of aerobic respiration, the alcohol formed being oxidized to CO_2 and H_2O ; (4) alcoholic fermentation is the first stage of aerobic respiration, but in the presence of air under normal conditions no alcohol is formed, because the intermediate products are oxidized; (5) alcoholic fermentation is the first stage of aerobic respiration, but the alcohol is used as constructive material. Of these possibilities he eliminates several, citing various researches which bear on them, and reports his own investigations, which indicate the correctness of the fourth hypothesis above. The small quantities of alcohol that have been observed by some investigators are easily accounted for by the assumption that the oxidative power of the plant does not always keep exact pace

¹⁵ KOSTYTSCHEW, S., Ueber den Zusammenhang der Sauerstoffatmung mit der Alkoholgärung. Ber. Deutsch. Bot. Gesells. 26:565-573. 1908.